CLAIMS

We claim:

1. In a method of arranging the raw material, energy and waste management of a production plant manufacturing pulp, paper, or board from recycled fibres, which plant receives and processes a first stream of waste material and a second stream of waste material, both streams being produced by a residential community, and being presorted and/or separately collected so that the first stream of waste material mainly contains combustible waste to be used as fuel in the production of energy required by the production plant and the second stream of waste material mainly contains waste paper and/or board to be used as fibre raw material of the production plant to a considerable extent, said second stream being passed to a pulping stage, to a cleaning and screening stage and to a fibre processing line comprising at least two of the stages of fractionating, deinking, bleaching, pulp drying and papermaking, and rejects from at least one of the stages are used as fuel in the production of energy, wherein the improvement comprises passing the first stream of waste material to a screening stage in which a residual paper-and board-rich fraction is separated from the first stream and passed to the pulping stage where it is processed either together with the second stream of waste material or separately from it to be used as fibre raw material in the manufacture of pulp, paper or board.

2. The method of claim 1 wherein the production plant produces waste fractions containing raw material and energy as a by-product of the production plant processes, said waste fractions comprising at least one of the group comprised of:

rejects and sludges produced in the fibre processing stages,
ash produced in the combustion of waste, and
warm waste waters,
and said waste fractions are utilized within the production plant either as raw material or as energy to a considerable extent, or said fractions are separated such that they can at least principally be used in a further process or another type of useful use outside the production plant.

3. The method of claim 2 wherein the waste fractions used as fuel are gasified and the thus obtained gas is used in a coal, natural gas or oil fired power plant as secondary fuel.

4. The method of claim 1 wherein the manufacture of pulp, paper, or board generates wastes selected from the group comprising:

a reject separated in pulping;
a fibre fraction of poor quality; and
a waste sludge generated in deinking,

and wherein said wastes are passed to the production of energy to serve as fuel.

5. The method of claim 4 wherein the wastes used as fuel are gasified and the thus obtained gas is used in a coal, natural gas or oil fired power plant as secondary fuel.

6. The method of claim 1 wherein the combustible waste to be used as fuel is gasified and the thus obtained gas is used as fuel in a gas turbine.

7. The method of 1 wherein the combustible waste to be used as fuel is gasified to produce combustible gas, and the gas produced by gasifying the combustible waste is used for producing hot drying air for the hot-air drying of pulp, paper or board.

8. The method of claim 7 wherein the drying of pulp, paper or board is accomplished solely as hot-air drying without any drying stages that require the use of steam.

9. The method of claim 1 wherein ash produced in the production of energy is used as filler in the manufacture of paper or board.

10. The method of claim 9 wherein the ash used as filler in the manufacture of paper or board is produced by burning or by gasifying a sorted waste paper fraction in a separate combustion boiler or gasification reactor intended for this use.

11. The method of claim 9 wherein the ash used as filler in the manufacture of paper or board is produced from ash from a combustion boiler or a gasification reactor by means of after-incineration or another bleaching process.

12. The method of claim 9 wherein a best quality fraction of the ash produced in the production of energy is used in the manufacture of paper or board and other ash fractions are utilized in other ways.

13. The method of claim 9, wherein the other ash fractions are utilized in at the manufacture of cement or earthwork.

14. The method of claim 1 wherein ash produced in the production of energy is used on flue gas scrubbers of power plants for cleaning flue gases.

15. The method of claim 1 wherein paper or board is manufactured by means of multi-layer web forming, in which connection pulp produced from different waste paper fractions is used for different layers of paper or board.

16. The method of claim 1wherein paper and/or board is manufactured on two or more manufacturing lines, using different types of waste paper fractions as fibre raw material.

17. The method of claim 16 wherein fibre waste and/or circulation water from a first manufacturing line is passed to a second manufacturing line.

18. The method of claim 1 wherein the production plant has a fresh water need, and wherein at least part of the fresh water need of the production plant is taken from a waste water treatment plant of the residential community as purified waste water, which is passed for use through a fresh water treatment system of the production plant.

19. The method of claim 18 wherein the waste water is purified by distillation utilizing waste heats generated in the production of energy and the thus distilled water is used in the production processes to replace some fresh water.

20. The method of claim 19 wherein distillation is used for purifying the production plant's own waste waters for recycling or for reducing the waste water load of the residential community.

21. The method of claim 1 wherein waste waters generated in the production plant are passed to a waste water treatment plant of the residential community for purification.

22. A production plant for manufacturing of pulp and/or paper and/or board, which plant is arranged to use waste materials as fibre raw material and as fuel and which plant comprises equipment for processing two presorted and/or separately collected streams of waste material obtained from an adjacent residential community, said two collected streams comprising a first stream and a second stream, the first stream mainly containing combustible waste and the second stream mainly containing waste paper and/or board, which equipment comprise devices for utilizing the first stream of waste material as fuel in the production of energy for at least the production plant's own requirements, devices for pulping, cleaning and screening the second stream of waste material, and a fibre processing line comprising devices for carrying out at least two of the processes of fractionating, deinking, bleaching, pulp drying and papermaking, wherein the improvement comprises:

a separating device to which the first stream of waste material is first passed for separating a paper- and board-rich fraction from the combustible waste, said paper- and board-rich fraction being passed to the devices for processing the second stream of waste material to be used as fibre raw material.

23. The production plant of claim 22 wherein the production plant produces waste fractions as by-products, said waste fractions containing raw material and energy, the waste fractions including at least one of:

rejects and sludges from pulping, cleaning, screening, fractionating and/or deinking devices;

ash produced in the production of energy; and

warm waste waters, wherein said waste fractions are utilized with the production plant or passed to useful use outside the production plant.

24. The production plant of claim 22 wherein the production plant comprises at least two paper or board manufacturing lines which are arranged to manufacture paper or board grades which are different from each other, such that different waste paper fractions can be utilized efficiently.

25. The production plant of claim 22 wherein the equipment for the manufacture of paper and/or board includes:

a paper or board machine having a multi-layer web former, owing to which different waste paper fractions can be efficiently utilized as raw materials in different layers of paper and/or board.

26. The production plant of claim 22 wherein the equipment for utilizing the first stream of waste material as fuel in the production of energy comprises an energy production unit having a gasification reactor arranged to gasify combustible waste fractions into product gases, which are arranged to be burnt in a combustion boiler or a gas turbine.

27. The production plant of claim 26 further comprising at least one hot-air drying device arranged to use purified product gas produced by the gasification reactor for the generation of hot drying air.

28. The production plant of claim 27 wherein the at least one hot-air drying device is selected from the group consisting of infrared dryers, impingement dryers, and airborne web-dryers.

29. The production plant of claim 27 wherein the drying of pulp, paper or board is accomplished solely by means of hot-air drying devices without any drying stages based on the use of steam.

30. The production plant of claim 22 wherein ash is produced as a by-product of the production of energy, and at least a part of the ash produced is arranged to be used as filler in paper or board in the papermaking process.

31. The production plant of claim 30 wherein the energy production unit includes a separate combustion boiler or gasification reactor, which is arranged to burn only a sorted waste paper fraction, the ash produced from said fraction being arranged to be passed to the papermaking process to serve as filler in paper or board.

32. The production plant of claim 30 further comprising devices for after-incineration of the ash generated as a by-product in the production of energy or for bleaching it in another way before it is used as filler in paper or board.

33. The production plant of claim 22 further comprising devices for using purified waste water derived from a waste water treatment plant of the residential community as fresh water in the production processes.

34. The production plant of claim 33 further comprising devices for purifying waste or circulation waters by distillation utilizing waste heat produced by the energy production unit.

35. The production plant of any one of claim 22 further comprising a waste water treatment plant of the residential community, and wherein waste waters from the production plant are passed to the waste water treatment plant of the residential community.

36. The production plant of claim 22 further comprising a plant for converting paper or board , said converting plant being integrated into the production plant's immediate vicinity, the converting plant being capable of converting a considerable part of the paper and/or board output of the production plant.

37. A production plant comprising:

a first stream of presorted waste material produced by a residential community mainly containing combustible waste to be used as fuel in the production of energy required by the plant;

a second stream of presorted waste material produced by the residential community mainly containing waste paper and board to be used as fibre raw material;

devices for processing the second stream including a pulping stage, and a cleaning and screening stage which receive the second stream;

a separating device to which the first stream of waste material is passed for separating a paper- and board-rich fraction from the combustible waste, said paper- and board-rich fraction being passed to the devices for processing the second stream of waste material to be used as fibre raw material;

a fibre processing line comprising at least two of the stages of fractionating, deinking, bleaching, pulp drying, and papermaking;

a first papermaking machine, receiving material from the second stream, as well as said paper- and board-rich fraction of the first stream; and

an energy production unit, receiving material from the first stream.

38. The production plant of claim 37 wherein rejects and sludges are produced in the fibre processing line stages, said rejects and sludges being passed to the energy production unit.

39. In a method of utilizing the fibre- and energy-containing fractions of wastes from a community in an economically profitable manner by combining a plant for the manufacture of fibrous products with a plant for the production of energy, the method comprising the steps of:

collecting a first fraction of municipal waste selected for the production of fibre;

collecting a second fraction of municipal waste selected for the production of energy;

processing the first fraction to produce a fibrous product;

processing the second fraction to produce energy; and

exchanging material between said the first fraction of municipal waste and said second fraction of municipal waste, and vice versa to improve the net economic return achieved from both the first fraction of municipal waste and the second fraction of municipal waste.

40. The method of claim 39 further comprising the step of exchanging material from the first fraction of municipal waste after it has been processed to form the fibrous product, and exchanging a second material from the second fraction of municipal waste after it has been processed to produce energy;

wherein the first material is selected from the group consisting of rejects and sludges produced in the fibre processing stages; and

wherein the second material is selected from the group consisting of:

ash produced in the combustion of waste, and warm waste water.